REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT
(Section 30(1) Regulation 22)

REPUBLIC OF SOUTH AFRICA
FORM P.1 REVENUE
(to be lodged in duplicate)

-7.5.99 R 2600

THE GRANT OF A PATENT IS HEREBY REQUESTED BY THE UNDERMENTIONED APPLICANT ON THE BASIS OF THE PRESENT APPLICATION FILED IN DUPLICATE

REPUBLIEK VAN SUID AFRIKA

21	01	PATENT APPLICATION NO 993179	A&A REF 141179

71	FULL NAME(S) OF APPLICANT(S)

LUNDIN INVESTMENTS (PROPRIETARY) LIMITED

ADDRESS(ES) OF APPLICANT(S)

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REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
PRIVATE BAG/PRIVAATSAK X400
1999 -05- 07

54	TITLE OF INVENTION

"A COMPOSITION FOR MIXING OIL AND WATER TO FORM A SOLUTION"

Only the items marked with an "X" in the blocks below are applicable.

[X] THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. The earliest priority claimed is
Country: ZA No: 98/4118 Date: 15 MAY 1998

[ ] THE APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO 21 01

[ ] THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO 21 01

THIS APPLICATION IS ACCOMPANIED BY:

- [X] Two copies of a complete specification of 14 pages
- [ ] Drawings of sheets
- [X] Publication particulars and abstract (Form P.8 in duplicate) (for complete only)
- [ ] A copy of Figure of the drawings (if any) for the abstract (for complete only)
- [ ] An assignment of invention
- [ ] Certified priority document(s). (State quantity)
- [ ] Translation of the priority document(s)
- [ ] An assignment of priority rights
- [X] A copy of Form P.2 and the specification of RSA Patent Application No 21 01 98/4118
- [X] Form P.2 in duplicate
- [ ] A declaration and power of attorney on Form P.3
- [ ] Request for ante-dating on Form P.4
- [ ] Request for classification on Form P.9
- [ ] Request for delay of acceptance on Form P.4
- [ ] Extra copy of informal drawings (for complete only)

74	ADDRESS FOR SERVICE: Adams & Adams, Pretoria

Dated this 7th day of MAY 1999

ADAMS & ADAMS
APPLICANTS PATENT ATTORNEYS

The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp

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A&A P201

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PRETORIA

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
DECLARATION AND POWER OF ATTORNEY
(Section 30 - Regulation 8, 22(i)(c) and 33)

FORM P.3

PATENT APPLICATION NO		
21	01	99/3179

A&A Ref: 141179 LVDW/tr

LODGING DATE	
22	7 MAY 1999

FULL NAME(S) OF APPLICANT(S)	
71	LUNDIN INVESTMENTS (PROPRIETARY) LIMITED

FULL NAME(S) OF INVENTOR(S)	
72	JUSTIN PETER CLOHESSY

EARLIEST PRIORITY CLAIMED	COUNTRY		NUMBER		DATE	
	33	ZA	31	98/4118	32	15 MAY 1998

NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations

TITLE OF INVENTION	
54	"A COMPOSITION FOR MIXING OIL AND WATER"

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PRIVATE BAG·PRIVAATSAK X400
1999 -05- 17

* I/We JACQUES DE KLERK

hereby declare that :-

~~1. I/we am/are the applicant(s) mentioned above;~~

** 2. I/we have been authorized by the applicant(s) to make this declaration and have knowledge of the facts herein stated in the capacity of DIRECTOR of the applicant(s);

*** 3. the inventor(s) of the abovementioned invention is/are the person(s) named above and the applicant(s) has/have acquired the right to apply by virtue of an assignment from the inventor(s);

4. to the best of my/our knowledge and belief, if a patent is granted on the application, there will be no lawful ground for the revocation of the patent;

~~**** 5. this is a convention application and the earliest application from which priority is claimed as set out above is the first application in a convention country in respect of the invention claimed in any of the claims;~~ and

6. the partners and qualified staff of the firm of **ADAMS & ADAMS**, patent attorneys, are authorised, jointly and severally, with powers of substitution and revocation, to represent the applicant(s) in this application and to be the address for service of the applicant(s) while the application is pending and after a patent has been granted on the application.

SIGNED THIS 5th DAY OF May 1999

Company Name: LUNDIN INVESTMENTS (PROPRIETARY) LIMITED
Full Names: JACQUES DE KLERK
Capacity: DIRECTOR

(no legalization necessary)

* In the case of application in the name of a company, partnership or firm, give full names of signatory/signatories, delete paragraph 1, and enter capacity of each signatory in paragraph 2.
** If the applicant is a natural person, delete paragraph 2.
*** If the right to apply is not by virtue of an assignment from the inventor(s), delete "an assignment from the inventor(s)" and give details of acquisition of right.
**** For non-convention applications, delete paragraph 5.

A&A P203

A & A Ref No: 141179

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FORM P7

REPUBLIC OF SOUTH AFRICA
Patents Act, 1978

COMPLETE SPECIFICATION

(Section 30 (1) - Regulation 28)

21	01	OFFICIAL APPLICATION NO

993179

22	LODGING DATE

7 MAY 1999

51	INTERNATIONAL CLASSIFICATION

B01F

71	FULL NAME(S) OF APPLICANT(S)

LUNDIN INVESTMENTS (PROPRIETARY) LIMITED

72	FULL NAME(S) OF INVENTOR(S)

JUSTIN PETER CLOHESSY

54	TITLE OF INVENTION

"A COMPOSITION FOR MIXING OIL AND WATER TO FORM A SOLUTION"

993179

THIS INVENTION relates to a composition for mixing oil and water to form a solution. It also relates to a solution of oil and water, and to a method of forming a solution of oil and water.

According to one aspect of the invention, there is provided a composition for mixing oil and water to form a solution, the composition including an esterified glycol mono alkyl ether in admixture with a non-aqueous base liquid.

According to another aspect of the invention, there is provided a composition for mixing oil and water to form a solution, the composition including an esterified glycol mono alkyl ether in admixture with a non-aqueous base liquid which includes at least one compound selected from the group consisting of an oil-soluble grade of alcohol ethoxylate, a diethanolamide of a higher fatty acid, ethylene glycol monobutyl ether, ethylene glycol mono ethyl ether, and a nonionic ethoxylated sorbitan ester.

In this specification, the term "solution" is meant to include a mixture which is clear, homogenous and substantially stable, and by "a composition for mixing oil and water to form a solution" is meant a composition which assists or facilitates the formation of a solution when water and oil are mixed.

The esterified glycol mono alkyl ether may be present in the composition in a concentration of from 5,1% to 6,9% by mass, more preferably in a concentration of from 5,5% to 6,5% by mass, and most preferably, in a concentration of from 5,7% to 6,3% by mass.

Unless otherwise indicated, all concentrations are given on a percentage by mass (mass %) basis.

In a preferred embodiment of the invention, the esterified glycol mono alkyl ether is propylene glycol methyl ether acetate ($C_6H_{12}O_3$).

The non-aqueous base liquid may include an oil-soluble grade of alcohol ethoxylate having a hydroxyl number greater than 160 and a melting point below -15°C. The alcohol ethoxylate may have a hydrophile-lipophile balance value (HLB value) of less than 9.

The alcohol ethoxylate may be present in the composition in a concentration of from 39% to 63% by mass, more preferably in a concentration of from 43% to 60% by mass. Most preferably, the alcohol ethoxylate is present in the composition in a concentration of from 47% to 56% by mass, e.g. 52,1% by mass and has a hydrophile-lipophile balance value between 7,7 and 8,3.

The alcohol ethoxylate is preferably in the form of a mixture of ethoxylates based on C_9 and C_{11} alcohols. The mixture of ethoxylates may also include ethoxylates of alcohols having chains of even numbers of carbon atoms. Examples of suitable alcohol ethoxylate mixtures are Kemelix 7145X (Trademark) available in the United Kingdom from ICI Chemicals Ltd, The Heath, Runcom, Cheshire, WAT40F, United Kingdom, Neodol 91/2.5E (Trademark), available in South Africa from Shell SA (Pty) Limited, Chemical Division, Rocks Road, Reunion, Durban, and Lutensol ON30 (Trademark), available in South Africa from BASF (Pty) Limited, 6 Carlisle Street, Paardeneiland, Cape Province.

The non-aqueous base liquid may include a diethanolamide of at least one higher fatty acid. The higher fatty acids mentioned with reference to the diethanolamide or diethanolamides include conventional emulsifier-forming acids.

The diethanolamide may be present if the composition in a concentration of from 7% to 24% by mass, preferably, in a concentration of from 10% to 21% by mass, and more preferably in a concentration of from 12% to 18% by mass, e.g. 15,3% by mass.

The diethanolamide may be selected from the group consisting of lauric diethanolamide, oleic diethanolamide, and mixtures thereof. Typically, equal portions of lauric and oleic diethanolamides are present in the composition.

The non-aqueous base liquid may include ethylene glycol monobutyl ether or ethylene glycol mono ethyl ether as a surfactant. The ethylene glycol monobutyl ether or ethylene glycol monoethyl ether, as the case may be, may be present in the composition in a concentration of from 1,2% to 1,8% by mass, more preferably in a concentration of from 1,3% to 1,7% by mass, and most preferably in a concentration of from 1,4% to 1,6% by mass, e.g. 1,5%.

The non-aqueous base liquid may include a nonionic ethoxylated sorbitan ester.

The sorbitan ester may be present in the composition in a concentration of from 2% to 48% by mass, more preferably in a concentration of from 13% to 37% by mass, and most preferably in a concentration of from 19% to 31% by mass, e.g. 25,2% by mass. The sorbitan ester may have a hydrophile-lipophile balance value between 16,4 and 16,7.

An example of a suitable nonionic-ethoxylated sorbitan ester is Polysorbate 20 (Trademark), which is available in South Africa from Croda Chemicals (SA) (Pty) Limited of 4 Lovora Street, Jetpark.

The composition of the invention is particularly, though not necessarily exclusively suitable for mixing fuel oils and water to form a solution. Even more particularly, the composition is suitable for mixing crude oil including its refined oils and petroleum products with water and diesel fuel oil and water, to form a solution. The composition may thus be used as an additive to diesel fuel oil.

The invention extends to a solution of an oil and water, which includes a composition as hereinbefore described.

The oil may be a fuel oil and the solution may include a fuel extender. The fuel extender may be selected from the group consisting of crude oil including its refined oils and petroleum products, an alcohol, such as ethanol, tallow, butter, vegetable oil, and mixtures thereof. The fuel extender may be present in the solution in a concentration of up to about 10%.

According to yet another aspect of the invention, there is provided a method of forming a solution of oil and water, the method including adding and mixing a composition as hereinbefore described, oil and water together, the composition being added in an amount sufficient to provide a clear solution on mixing.

An appropriate quantity of the composition of the invention to be added to a water and oil mixture comprising a few (e.g. 2 to 10) volumetric parts water per 100 volumetric parts oil is typically between about 10 and 25 volumetric parts composition per 100 volumetric parts of water and oil mixture. The addition of too low a quantity of composition to the oil and water is to be avoided as it will

result in an emulsion being formed instead of a solution. Examples of suitable volumetric ratios of the composition, diesel oil and water added together are 10:116:2, 15:116:5 and 25:116:10.

Thus, the volumetric ratio of the composition to the combined oil and water may be between 8:100 and 20:100 and the volumetric ratio of the water to the oil may be between 1:100 and 10:100. Preferably, the volumetric ratio of the composition to the combined oil and water is between 12,3:100 and 19,8:100 and the volumetric ratio of the water to the oil is between 1,7:100 and 8,6:100.

The invention will now be described with reference to the following non-limiting examples:

EXAMPLE 1

A composition comprising Kemelix 7145X (52.07%), lauric diethanolamide (7.64%), oleic diethanolamide (7.64%), propylene glycol methyl ether acetate (6.00%), ethylene glycol monobutyl ether (1.50%) and Polysorbate 20 (25.15%) was prepared.

2ml of water were added to 100g of diesel fuel oil. Under stirring with a high speed stirrer, 10ml of the composition as prepared were added to the water and diesel fuel oil. The result was a clear and stable solution showing now sign of breaking down after an extended period of time and at a temperature ranging between -3°C and +50°C. Thus, the oil and water mixture incorporating the composition of the invention formed a clear homogenous solution showing no signs of separation or instability.

EXAMPLE 2

5ml of water were added to 100g of diesel fuel oil. Under stirring with a high speed stirrer, 15ml of the composition as prepared for Example 1, were added to the water and diesel fuel oil. The result was a clear and stable solution showing no sign of breaking down after an extend period of time and at a temperature ranging between -3°C and +50°C. Thus, the oil and water mixture incorporating the composition of the invention formed a clear homogenous solution showing no signs of separation or instability.

EXAMPLE 3

10ml of water were added to 100g of diesel fuel oil. Under stirring with a high speed stirrer, 25ml of the composition as prepared for Example 1 were added to the water and diesel fuel oil. The result was a clear and stable solution showing no signs of breaking down after an extended period of time and at a temperature ranging between -3°C and +50°C. Thus, the oil and water mixture incorporating the composition of the invention formed a clear homogenous solution showing no signs of separation or instability.

The Applicant expects that a fuel which includes the composition of the invention, as exemplified, will have an improved performance, will lead to a lower fuel consumption, and will have a cleaning effect on an engine. It is also an advantage of the composition, as exemplified, that it has a neutral effect on the octane and cetane ratings of diesel. The Applicant further expects a fuel which includes the composition of the invention, as exemplified, to have improved atomization properties, to burn more completely and cleanly and to have an improved flowability through pipelines.

It is a further advantage of the composition of the invention, as exemplified, that it allows or assists in the formation of a stable solution of water and oil, which shows no sign of breaking down after an extended period of time.

CLAIMS

1. A composition for mixing oil and water to form a solution, the composition including an esterified glycol mono alkyl ether in admixture with a non-aqueous base liquid.

2. A composition as claimed in claim 1, in which the esterified glycol mono alkyl ether is present in the composition in a concentration of from 5,1% to 6,9% by mass.

3. A composition as claimed in claim 2, in which the esterified glycol mono alkyl ether is present in the composition in a concentration of from 5,7% to 6,3% by mass.

4. A composition as claimed in any one of the preceding claims, in which the esterified glycol mono alkyl ether is propylene glycol methyl ether acetate.

5. A composition as claimed in any one of the preceding claims, in which the non-aqueous base liquid includes an oil-soluble grade of alcohol ethoxylate having a hydroxyl number greater than 160, a melting point below -15°C, and a hydrophile-lipophile balance value of less than 9.

6. A composition as claimed in claim 5, in which the alcohol ethoxylate is present in the composition in a concentration of from 39% to 63% by mass.

7. A composition as claimed in claim 6, in which the alcohol ethoxylate is present in the composition in a concentration of from 47% to 56% by mass and has a hydrophile-lipophile balance value between 7,7 and 8,3.

8. A composition as claimed in any one of claims 5 to 7 inclusive, in which the alcohol ethoxylate is in the form of a mixture of ethoxylates based on C_9 and C_{11} alcohols.

9. A composition as claimed in claim 8, in which the mixture of ethoxylates also includes ethoxylates of alcohols having chains of even numbers of carbon atoms.

10. A composition as claimed in any one of the preceding claims, in which the non-aqueous base liquid includes a diethanolamide of at least one higher fatty acid.

11. A composition as claimed in claim 10, in which the diethanolamide is present if the composition in a concentration of from 7% to 24% by mass.

12. A composition as claimed in claim 11, in which the diethanolamide is present in the composition in a concentration of from 12% to 18% by mass.

13. A composition as claimed in any one of claims 10 to 12 inclusive, in which the diethanolamide is selected from the group consisting of lauric diethanolamide, oleic diethanolamide, and mixtures thereof.

14. A composition as claimed in any one of the preceding claims, in which the non-aqueous base liquid includes ethylene glycol monobutyl ether or ethylene glycol mono ethyl ether.

15. A composition as claimed in claim 14, in which the ethylene glycol monobutyl ether or ethylene glycol monoethyl ether, as the case may be, is present in the composition in a concentration of from 1,2% to 1,8% by mass.

16. A composition as claimed in any one of the preceding claims, in which the non-aqueous base liquid includes a nonionic ethoxylated sorbitan ester.

17. A composition as claimed in claim 16, in which the sorbitan ester is present in the composition in a concentration of from 2% to 48% by mass.

18. A composition as claimed in claim 17, in which the sorbitan ester is present in the composition in a concentration of from 19% to 31% by mass and has a hydrophile-lipophile balance value between 16,4 and 16,7.

19. A composition for mixing oil and water to form a solution, the composition including an esterified glycol mono alkyl ether in admixture with a non-aqueous base liquid which includes at least one compound selected from the group consisting of an oil-soluble grade of alcohol ethoxylate, a diethanolamide of a higher fatty acid, ethylene glycol monobutyl ether, ethylene glycol mono ethyl ether, and a nonionic ethoxylated sorbitan ester.

20. A composition as claimed in claim 19, in which the esterified glycol mono alkyl ether is present in the composition in a concentration of 5,1% to 6,9% by mass.

21. A composition as claimed in claim 20, in which the esterified glycol mono alkyl ether is present in the composition in a concentration of from 5,7% to 6,3% by mass.

22. A composition as claimed in any one of claims 19 to 21 inclusive, in which the esterified glycol mono alkyl ether is propylene glycol methyl ether acetate.

23. A composition as claimed in any one of claims 19 to 22 inclusive, in which the non-aqueous base liquid includes the oil-soluble grade of alcohol ethoxylate, the alcohol ethoxylate having a hydroxyl number greater than 160, a melting point below -15°C, and a hydrophile-lipophile balance value of less than 9.

24. A composition as claimed in claim 23, in which the alcohol ethoxylate is present in the composition in a concentration of from 39% to 63% by mass.

25. A composition as claimed in claim 24, in which the alcohol ethoxylate is present in the composition in a concentration of from 47% to 56% by mass and has a hydrophile-lipophile balance value between 7,7 and 8,3.

26. A composition as claimed in any one of claims 23 to 25 inclusive, in which the alcohol ethoxylate is in the form of a mixture of ethoxylates based on C_9 and C_{11} alcohols.

27. A composition as claimed in claim 26, in which the alcohol ethoxylate is in the form of a mixture of ethoxylates based on C_9 and C_{11} alcohols.

28. A composition as claimed in any one of claims 19 to 27 inclusive, in which the non-aqueous base liquid includes the diethanolamide of at least one higher fatty acid.

29. A composition as claimed in claim 28, in which the diethanolamide is present if the composition in a concentration of from 7% to 24% by mass.

30. A composition as claimed in claim 29, in which the diethanolamide is present in the composition in a concentration of from 12% to 18% by mass.

31. A composition as claimed in any one of claims 28 to 30 inclusive, in which the diethanolamide is selected from the group consisting of lauric diethanolamide, oleic diethanolamide, and mixtures thereof.

32. A composition as claimed in any one of claims 19 to 31 inclusive, in which the non-aqueous base liquid includes the ethylene glycol monobutyl ether or the ethylene glycol monoethyl ether.

33. A composition as claimed in claim 32, in which the ethylene glycol monobutyl ether or ethylene glycol monoethyl ether, as the case may be, is present in the composition in a concentration of from 1,2% to 1,8% by mass.

34. A composition as claimed in any one of claims 19 to 33 inclusive, in which the non-aqueous base liquid includes the nonionic ethoxylated sorbitan ester.

35. A composition as claimed in claim 34, in which the sorbitan ester is present in the composition in a concentration of from 2% to 48% by mass.

36. A composition as claimed in claim 35, in which the sorbitan ester is present in the composition in a concentration of from 19% to 31% by mass and has a hydrophile-lipophile balance value between 16,4 and 16,7.

37. A solution of oil and water, which includes a composition as claimed in any one of the preceding claims.

38. A solution as claimed in claim 37, in which the oil is a fuel oil and which includes a fuel extender.

39. A solution as claimed in claim 38, in which the fuel extender is selected from the group consisting of crude oil including its refined oils and petroleum products, an alcohol, tallow, butter, vegetable-oil, and mixtures thereof.

40. A method of forming a solution of oil and water, the method including adding and mixing a composition as claimed in any one of claims 1 to 36 inclusive, oil and water together, the composition being added in an amount sufficient to provide a clear solution on mixing.

41. A method as claimed in claim 40, in which the volumetric ratio of the composition to the combined oil and water is between 8:100 and 20:100 and the volumetric ratio of the water to the oil is between 1:100 and 10:100.

42. A method as claimed in claim 41, in which the volumetric ratio of the composition to the combined oil and water is between 12,3:100 and 19,8:100 and the volumetric ratio of the water to the oil is between 1,7:100 and 8,6:100.

43. A method as claimed in any one of claims 40 to 42 inclusive, in which the oil is a fuel oil.

44. A composition as claimed in claim 1 or claim 19, substantially as herein described and illustrated.

45. A solution as claimed in claim 37, substantially as herein described and illustrated.

46. A method of forming a solution of oil and water as claimed in claim 40, substantially as herein described and illustrated.

47. A new composition, a new solution, or a new method of forming a solution, substantially as herein described.

DATED THIS 7TH DAY OF MAY 1999

ADAMS & ADAMS
APPLICANT'S PATENT ATTORNEYS